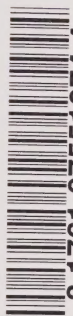


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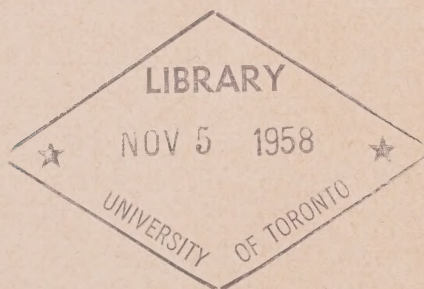


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EXPERIMENTAL FARM

KENTVILLE, NOVA SCOTIA

PROGRESS REPORT
1952-1956



EXPERIMENTAL FARMS SERVICE
CANADA DEPARTMENT OF AGRICULTURE
OTTAWA, ONTARIO


**EXPERIMENTAL FARM
KENTVILLE, NOVA SCOTIA**

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TABLE OF CONTENTS

	PAGE
Introduction	5
Weather	5
Tree Fruits	8
Small Fruits	13
Native Fruits	16
Vegetables	18
Storage and Plant Nutrition	25
Fruit and Vegetable Processing	30
Field Husbandry	33
Poultry	36
Illustration Stations	38
Publications	42



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Progress Report 1952-1956

Experimental Farm, Kentville, Nova Scotia

INTRODUCTION

The Experimental Farm at Kentville was established in 1911 and is mainly devoted to horticultural research related to problems of the fruit industry of the Annapolis Valley. It also deals in a more general way with broader agricultural investigations for the western part of Nova Scotia. Besides horticulture, research is being conducted in poultry, field husbandry and animal husbandry.

Six Illustration Stations are supervised in western Nova Scotia as a means of demonstrating new research findings and determining their application under different soil and climatic conditions.

The period of the present report covers the years 1952-1956 inclusive and follows the previous 5-year Progress Report published in 1951. In addition to this report, research work from this farm is published through the following outlets: (1) scientific research papers, (2) various technical and popular bulletins, (3) an annual Highlights Bulletin (joint publication of all the Atlantic Province Experimental Farms), and (4) various popular articles and news releases in the press.

Because of space limitations, it is only possible to include brief reports of some of the research work carried on during the period. Further information may be obtained on request.

WEATHER

The following meteorological records are included to provide a general picture of climatic conditions at the Experimental Farm (Tables 1, 2 and 3).

Table 1.—Precipitation Records, Experimental Farm, Kentville, N.S. Monthly and annual precipitation records (inches) 1952-56, inclusive, with 43-year averages and monthly extremes.

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total annual		
													Snow- fall	Rain- fall	Precip- itation
1952	in. 6.91	in. 4.93	in. 3.20	in. 1.67	in. 2.44	in. 2.19	in. 1.55	in. 5.21	in. 2.52	in. 1.41	in. 2.30	in. 2.95	in. 136.2	in. 23.66	in. 37.28
1953	2.17	4.44	2.00	2.32	2.86	1.48	3.05	4.99	3.80	3.64	2.18	4.02	31.5	33.80	36.95
1954	5.99	6.78	2.77	1.84	2.62	2.94	1.71	3.72	1.48	4.08	3.69	4.58	97.9	32.41	42.20
1955	4.94	2.64	3.42	1.96	1.75	1.62	1.49	3.89	2.20	1.57	3.51	2.65	103.6	21.28	31.64
1956	10.19	4.70	5.87	2.59	2.31	1.87	1.91	1.72	2.81	1.12	4.19	3.86	136.1	29.53	43.14
5-year average	6.04	4.69	3.45	2.08	2.39	2.02	1.94	3.90	2.56	2.36	3.17	3.61	101.1	28.14	38.24
43-year average	4.16	3.44	3.22	3.17	2.77	2.83	2.78	3.41	3.38	3.73	3.97	4.05	82.4	32.26	40.48
Extremes for the 43-year period, 1914-1956	Low	1.21	0.95	1.43	0.67	1.03	0.67	0.52	0.85	0.40	1.14	1.51	31.5	21.28	30.35
	Year	1936	1915	1918	1924	1946	1937	1934	1915	1947	1939	1943	1953	1955	1915
	High	10.19	6.78	4.95	7.66	6.32	5.63	9.39	10.58	11.69	7.71	6.08	156.4	48.01	48.21
Year	1956	1954	1956	1946	1945	1945	1922	1927	1942	1933	1934	1951	1926	1933	1945

Table 2.—Temperature Records, Experimental Farm, Kentville, N.S., Mean monthly temperatures (degrees F.) 1952-56, with 43-year averages and monthly extremes.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean annual temperature
1952.....	24.32	25.50	29.98	42.70	47.97	59.92	68.94	66.37	57.06	46.86	38.40	29.01	44.75
1953.....	28.98	27.68	32.85	44.40	52.71	60.22	66.42	63.23	59.19	48.77	42.75	34.27	46.79
1954.....	20.88	29.10	30.91	39.88	47.95	60.57	64.40	62.22	56.90	50.44	39.19	33.55	44.67
1955.....	25.10	24.71	29.78	39.43	51.25	59.51	67.02	66.72	56.50	47.95	37.32	22.50	43.98
1956.....	30.10	22.36	23.73	38.78	46.11	60.83	63.32	61.34	54.83	47.04	42.15	28.14	43.23
5-year average.....	25.88	25.87	29.45	41.04	49.19	60.21	66.02	63.98	56.89	48.21	39.96	29.49	44.68
43-year average.....	21.54	20.99	29.31	39.74	50.29	59.48	66.29	64.95	57.72	48.11	37.89	26.27	43.55
Extreme means for the 43-year period, 1914-1956	Low.....	10.10	10.87	20.69	43.63	50.99	61.11	60.66	53.39	41.32	29.87	17.75	40.99
	Year.....	1920	1923	1923	1917	1943	1950	1923	1950	1925	1933	1933	1923
	High.....	30.10	29.10	38.79	54.23	69.49	71.51	69.89	63.22	51.07	43.02	34.27	46.79
	Year.....	1956	1954	1936	1942	1930	1947	1937	1934	1932	1950	1953	1953
Extreme temperatures for the 43-year period, 1914-1956	Low.....	-22	-24	-18	5	20	37	36	26	18	3	-14	-24
	Year.....	1925	1920	1948	1923	1945	1919	1926	1922	1925	1916	1922	1920
		1951			1947	1947		1947	1942		1933		
	High.....	60	59	72	79	89	97	100	91	83	74	65	100
	Year.....	1930	1951	1945	1921	1929	1949	1944	1942	1930	1953	1949	1944

Table 3.—Frost Records, Experimental Farm, Kentville, N.S.
Frost: 32° F. or lower; killing frost, 28° F. or lower

Year	Last frost in spring	First frost in fall	Number of frost-free days	Last killing frost in spring	First killing frost in fall	Number of crop days (above 28° F.)
1952.....	May 24	Sept. 9	107	May 6	Oct. 11	157
1953.....	May 30	Sept. 30	122	May 3	Oct. 12	161
1954.....	May 28	Oct. 8	132	May 14	Oct. 8	146
1955.....	May 18	Sept. 10	114	May 18	Oct. 6	140
1956.....	May 28	Sept. 22	117	May 27	Sept. 27	122
44-year average.....	May 24	Sept. 27	125	May 7	Oct. 13	158
Shortest frost-free period, 1943.....	June 15	Sept. 19	95			
Longest frost-free period, 1937.....	May 3	Oct. 3	152			
Shortest crop season, 1956.....				May 28	Sept. 27	122
Longest crop season, 1917.....				Apr. 20	Nov. 1	194

Earliest and latest frost dates, 1913-1956:

Latest spring frost.....	June 15, 1943
Earliest last spring frost.....	May 3, 1937
Earliest fall frost.....	Sept. 9, 1942
Latest first fall frost.....	Sept. 9, 1952
	Oct. 20, 1933

Earliest and latest killing frost dates, 1913-1956:

Latest spring killing frost.....	May 28, 1933
Earliest last killing frost of spring.....	April 17, 1916
Earliest fall killing frost.....	Sept. 27, 1956
Latest first killing frost of fall.....	Nov. 9, 1927

TREE FRUITS

Tree Fruit Variety Testing

(R. P. LONGLEY)

Apples

Extensive variety testing has been carried on in continual search for varieties more nearly approaching the ideal apple. Whenever promising new varieties become available they are secured and tested. There are now 168 varieties on the Farm and about 50 of these have not yet fruited.

Of the introductions in recent years Macoun is the only one that has gained a place among our eight most favored post-Gravenstein varieties. Idared is the most promising of the new ones. It is ready for extensive tests to determine if it has sufficient of the needed qualities. To date when grown on young trees and with some fruit thinning it has been an annual bearer of above average sized apples of an attractive bright red color. The fruit keeps well in storage until late winter and has good but not outstanding dessert quality. Nursery trees are now available for an extensive test.

Four other varieties are being closely watched, namely: Crandall, Davey, Garnet and Hume. Probably none of these is late enough to fill the present need.

Much attention recently has been given to red strains of varieties, particularly Red Delicious. While Richared and Starking are considered excellent, it seems probable that the super excellence claimed for some of the newer introductions should be investigated for tree size, yield and fruit color. Work on such has begun. A number of new strains of McIntosh are also being included in a similar study.

Pears

The pear variety situation is quite satisfactory. Nearly all the pears in the commercial orchards are of two excellent varieties, namely Bartlett and Clapps Favorite, which are grown to near perfection. Several other good ones are found in the Farm orchard including the relatively new varieties Beierschmitt, Cayuga and Ewart and the old ones d'Anjou and Sheldon. The development of these as late fall or early winter pears for the local market is dependent on development of a storage and marketing system.

Peaches

Though locally of small commercial importance, peaches attract much attention in Nova Scotia. Due to low winter temperatures the crop in many years is materially reduced in the Kentville district. In 1951 for example, it was completely eliminated, and in 1956 the cold winter which extended into early spring reduced the crop by one-half while the cool summer season caused the late midseason and late peaches to be of very inferior quality.

During the past five years Jerseyland, Dixigem and Redhaven have been added to the recommended list of varieties, which included Golden Jubilee, Marigold, Vedette and Oriole. Redhaven, an early heavy-producing variety of fine appearance, has probably moved up to first place in importance in the area's plantings. It is a bit lower in quality than some but is still very acceptable. The greatest present need is for varieties which have greater cold resistance.

Plums

The plum industry in Nova Scotia is in a most confused state. The loss of trees due to black knot has been heavy in many orchards and has discouraged planting. The situation in the Farm orchard is relatively satisfactory. Black knot has been serious, but by careful cutting and spraying it has been held in check. The original plantings were made in 1940 and 1942. Since that time it is of interest to note the very heavy losses of trees of the Japanese and American hybrids and the relatively good livability of the European varieties.

Because of leaf spot, relatively poorer fruit quality, and the short life of the trees of Japanese and American hybrids, the interest is largely in the European varieties in spite of the fine fruit appearance of the former. No new varieties have been added recently to the recommended list.

Cherries

Cherries in Nova Scotia could be grouped with peaches on the basis of hazards and risks. Nearly every year some of the blossom buds are damaged, particularly on the lower branches. Even so, some very good crops have been produced, though the birds, brown rot and cracking cause considerable loss.

The preference locally is for dark red or black varieties. Napoleon is not wanted when the others are available. Bing, Hedelfinger, Gil Peck and Lambert are the standards. The new variety Starking Hardy Giant looks fine and should have extensive testing.

Relationship between apple bloom and yield

The relationship between amount of bloom on apple trees and resulting yields was carefully investigated from 1949 to 1955. All apple trees in the Farm orchards of varieties with eight or more trees set in 1940 or earlier were used, regardless of their other experimental uses such as being in cultural, fertilizer, rootstock or other tests.

The bloom was scored on the basis of "10" for trees with full bloom. Eleven classes were used, the "0" being completely without bloom. Two subclasses scored and used were "zero plus" for trees with only a very few clusters, and "one minus" for trees that were definitely below a score of "one" or 10 per cent of a full bloom. Tree trunks were measured about 10 inches above ground level at a marked spot to determine trunk cross section. Yields were secured in the usual way.

For the different classes production is recorded in yield per 100 sq. cm. of trunk cross section.

Table 4 gives these yields for all varieties and for three separate varieties Cortland, McIntosh and Northern Spy.

Table 4.—Yield of apple trees at the Experimental Farm 1949-55 in pecks per 100 sq. cm. of trunk cross section arranged on classification of amount of bloom.

Amount of bloom	All varieties		Cortland yield	McIntosh yield	Spy yield
	No. of trees	yield			
0.....	214	0.00	0.00	0.00	0.00
0+.....	976	0.22	0.41	0.20	0.17
1-.....	241	1.00	0.65	1.12	0.79
1.....	622	1.27	0.91	1.09	1.35
2.....	519	2.14	2.18	2.68	2.02
3.....	540	2.70	3.38	3.09	3.12
4.....	557	3.35	4.89	3.83	3.51
5.....	395	4.42	6.24	4.59	5.27
6.....	448	4.67	7.98	6.22	5.28
7.....	507	5.33	8.29	6.26	6.66
8.....	829	5.97	9.88	7.35	7.28
9.....	984	7.59	11.13	8.60	9.44
10.....	4,395	9.17	13.34	10.37	11.13
Total and average.....	11,227	5.68	10.64	7.13	6.63
Amount of bloom.....		64.14%	82.18%	70.42%	63.05%

These data show that there is very nearly a straight line relationship between the amount of bloom and the yield from the apple trees on the Farm. Trees with a 50 per cent bloom produce a half crop and trees with a 30 per cent bloom a corresponding amount.

Stembuilders for apple trees

In 1939 a project was begun designed to study the value of double-working apple trees. The development of the project was recorded in the 1947-51

progress report. Trees on Haas and Hibernial stempieces have apparently grown and produced very similarly to single-worked trees. Trees on Virginia Crab stempieces had the best start due to the vigorous growth of the Virginia Crab trees. These trees were very precocious, much more so than the trees on Haas and Hibernial. They also quickly showed slower growth rates and degeneration symptoms. The effect on Red Spy, Starking and Cortland was such that now many of these trees are of little if any value. This is not true of the Wageners and the Golden Delicious which are still growing normally, even if a bit more slowly, and are producing as well or better than the trees on the other stempieces.

The developments with respect to tree size and yields are shown in Table 5.

While double-working for hardiness does not appear necessary in this area and while Virginia Crab apparently is incompatible with some varieties, the performance of the Wagener and Golden Delicious trees suggests that further attention might be paid to the use of Virginia Crab stempieces for certain varieties as a means of increasing their early production.

Table 5.—Average tree sizes and yields of varieties double-worked on Haas, Hibernial and Virginia Crab stems.

Trunk	Variety	No. of trees	Trunk cross section sq. cm.			Per cent increase		Yield pecks to		Total
			1947	1951	1956	1947-51	1951-56	1951	1952-56	
Haas.....	Wagener.....	12	23.8	56.8	118	138	107	5.07	40.1	45.2
	Cortland.....	11	33.6	91.4	187	172	104	17.33	77.6	94.9
	Starking.....	8	23.1	63.5	147	175	131	7.31	43.3	50.6
	G. Delicious...	11	41.8	110.6	219	165	98	30.45	68.0	98.5
	Red Spy.....	10	34.4	120.7	276	251	129	8.35	98.2	106.6
Hibernial..	Wagener.....	7	27.9	70.4	142	153	101	10.58	55.3	65.9
	Cortland.....	8	37.2	95.5	197	157	106	23.93	83.9	107.8
	Starking.....	10	27.0	73.0	160	170	119	8.03	39.8	47.8
	G. Delicious...	13	49.6	116.0	226	134	94	30.15	75.6	105.7
	Red Spy.....	15	30.0	93.4	222	212	137	7.72	65.0	72.8
Virginia Crab....	Wagener.....	8	34.4	63.6	110	85	73	16.76	49.6	66.3
	Cortland.....	8	36.6	62.1	95	70	53	26.00	40.1	66.1
	Starking.....	12	27.9	47.0	75	69	59	6.13	21.4	27.5
	G. Delicious...	12	66.0	140.8	234	113	67	52.34	85.5	137.8
	Red Spy.....	14	35.7	67.1	104	88	55	15.42	28.8	44.3

Influence of chemical thinning on biennial bearing

Over a period of years one block of orchard containing 77 McIntosh trees developed a serious biennial bearing habit. It was possible to divide the block into halves of equal production, and to thin one-half chemically in the "on" year, leaving the other half for comparison. Over a four-year period the

chemically thinned half of the orchard produced uniformly good crops each year (Table 6) while the unthinned half retained its biennial bearing habit. The resulting increase in yield was 30.9 per cent.

Table 6.—Influence of chemical thinning on biennially bearing McIntosh.

	(yield in pounds per tree)						
	1951	1952	1953	1954	1955	1956	Total 1953-56
Thinned.....	481	23	457*	715	565**	606	2,343
Unthinned.....	488	13	534	268	820	168	1,790

*Thinned with 25 p.p.m. naphthalene acetic acid.

**Thinned with 40 p.p.m. naphthaleacetamide.

Apple Breeding

(C. J. BISHOP)

An extensive apple breeding program is being carried on with the principal objective to produce a late high-quality apple variety with red color. The earlier project including some 30,000 seedlings produced from 1928 to 1934 has reached the stage where all culling has been completed and less than 100 seedlings remain. Most of these are presently in a series of second-test orchards established on different soil types in the area, and include several promising selections.

Further extensive crosses were made from 1948 onward and seedlings from these now number about 15,000. The oldest of these are just beginning to bear fruit. Included in these more recent crosses are tetraploid-diploid hybrids, made with the objective of evaluating the possibilities of this type of cross in apple breeding. Also there are a large number of hybrids with species of apples which carry the factor for resistance to apple scab. One group of these has the parent Geneva Crab and inoculation tests made by the Plant Pathology Laboratory indicate that about 10 to 15 per cent of the seedlings show resistance and about 5 per cent are immune to scab infection. A second group includes seedlings from back-cross selections of such species as *Malus floribunda* and *Malus prunifolia*. A much higher proportion of the seedlings of these parents show scab immunity but the fruits are smaller and lower in quality than those from Geneva Crab.

Radiation-induced mutations

Another phase of the apple breeding project has been the investigation of the use of artificial radiation to induce color sports of present varieties. This work involved the use of X-rays in the early phases and more recently also thermal neutrons. Altogether nearly 13,000 scions have been irradiated, about half of which were from the Cortland variety.

Thermal neutrons were found to be genetically more effective than X-rays and as a result of these treatments a large number of sectorial chimaeras have resulted as well as a few completely dark red sports. The latter are very distinctive and show a dark red color similar in shade to the variety Macoun. They are now being propagated and it is hoped may prove of commercial value.

SMALL FRUITS

(D. L. CRAIG)

Strawberries

Variety testing

The introduction in 1953 of virus-free strawberry plants by the United States Department of Agriculture has brought about a major change in the variety test plots. Many of the varieties that had been carried prior to 1953 were discarded because of the uselessness of comparing, on a yield basis, virus-infected and virus-free plants. Virus-free plants invariably outyield virus-infected stock by a wide margin.

To date only a limited number of the varieties suitable for this area have been freed of virus diseases. The Temple, Valentine and Pathfinder varieties are still virus-infected and will no doubt be replaced later by some of the newly introduced varieties now under test.

A two-year comparison of virus-free and common stock strawberry plants

In 1955 and 1956 replicated and randomized plots of virus-free and common stock strawberry plants were fruited at this Farm. Virus-free plants of the varieties Catskill, Premier, Senator Dunlap and Sparkle were secured from an American nursery and used in this comparison. The common stock used had been propagated for a number of years at this Farm and was typical of the stock grown by most commercial strawberry producers in this area of Nova Scotia. The results showed a decidedly higher yield from the virus-free plants of each variety (Table 7).

Table 7.—A two-year average yield for virus-free and common stock strawberry plants.

Variety	Quarts per acre	Variety	Quarts per acre
Premier (virus-free).....	11,756	Dunlap (virus-free).....	9,548
Premier (common).....	5,032	Dunlap (common).....	4,764
Catskill (virus-free).....	13,068	Sparkle (virus-free).....	16,600
Catskill (common).....	8,016	Sparkle (common).....	6,192

Strawberry root rot studies

Recent investigations conducted at a number of research institutions in America and in Europe have shown that strawberry root rot can be associated with soil inhabiting nematodes. A preliminary type of survey of local strawberry fields has revealed the presence of large numbers of meadow nematodes (*Pratylenchus penetrans*) associated with strawberry roots. This is one of the species parasitic on strawberry roots and had not previously been considered a factor in the growth of strawberry plants in this area.

During the past two years a number of experimental plots have been treated with soil fumigants for the control of this parasite. The results to date indicate that strawberry plants grown on fumigated soil which had previously grown strawberries are more vigorous and more productive than those growing on nonfumigated soil. Further work is in progress for the control of nematodes in strawberry fields.

Strawberry plant improvement program

This program which is a co-operative one with the Provincial Department of Agriculture has taken on added importance with the recent introduction of virus-free strawberry plants.

The first step has been the development by the Departments and the acceptance by the nurseries of a scheme for improved plant production. For the past two years the co-operating nurseries have followed this program which, among other things, requires the nurseries to follow a very rigid insecticide dusting program for the control of virus-spreading aphids.

An additional step has been the construction in 1956 of a screened house (Figure 1) at this Farm. The fine, plastic screen covering the house keeps insects out and virtually eliminates the chance of the plants growing inside becoming virus infected.

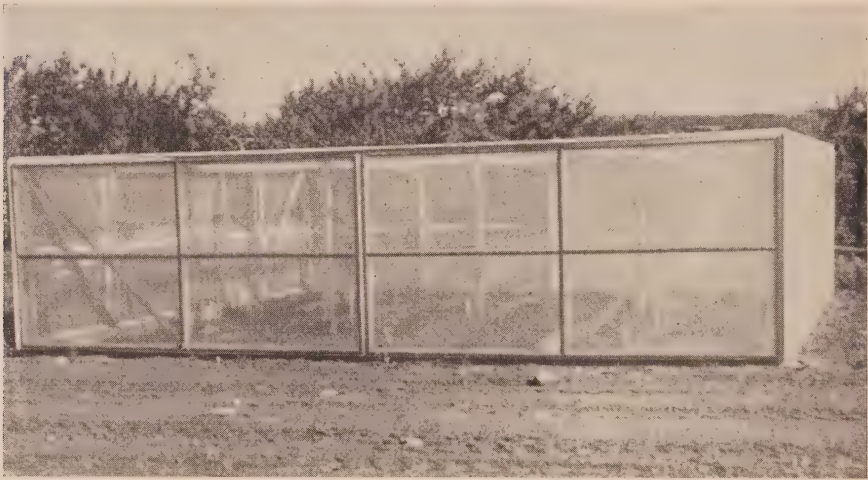


Figure 1. Screenhouse constructed to protect virus-free strawberry clones from virus-carrying aphids.

As a further guarantee of freedom from virus, each clone is indexed for virus by grafting the runner of the plant to be tested to the runner of a virus-sensitive strawberry plant.

The last step, which is now in its final stage of development, is the production on the farm of one special isolated grower of all the planting stock required by the co-operating nurseries. The special stock grower will be re-supplied yearly with indexed stock from the Farm screened house.

As a result of this program the commercial grower will have available strawberry plants which are as free from disease as it is possible to obtain them.

Chemical weed control in strawberries

During the past few years a number of chemicals for the control of weeds in strawberry plantings have been evaluated in replicated and randomized plots. Of the chemicals tested, only Crag Herbicide 1 (SES) is of value in controlling weeds in strawberries although 2,4-D has a limited use for the control of broad-leaf weeds at specific times in the strawberry plant's development.

Crag Herbicide 1 (SES) is effective for periods up to four weeks and acts only against germinating weed seeds.

The test of chemicals for weed control is a continuing one, and as new chemicals become available they will be evaluated. In 1956 twenty-seven different treatments were applied to the strawberry plots.

Strawberry breeding

During the past five years 14,685 strawberry seedlings have been grown at this Farm. Of this number 7,531 have resulted from varietal and species crosses involving many different parents, and the remainder (7,154 seedlings) were for a study of seedling combining ability.

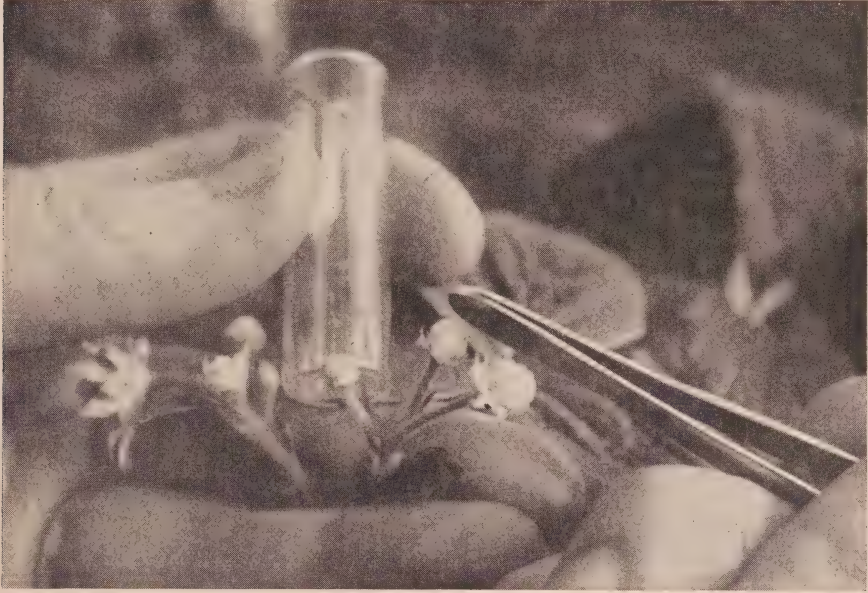


Figure 2. Varietal crossing in strawberries showing the transfer of pollen from one variety to the emasculated flowers of another.

Many different varieties have been crossed (Figure 2) and from each cross several hundred seedlings grown to maturity. The object has been to select desirable types from the seedling populations and to propagate them as such. A late fruiting, bright, and very firm fleshed berry is desired for this area. To date ten selections have been made. After evaluating these selections in 30-foot long observational rows those not discarded are placed in a regular variety test plot. In 1956 three selections from a Catskill \times Temple cross had reached this stage.

Raspberries

Variety testing

The raspberry variety picture has changed little during the past five years. A number of new varieties have been tested and discarded and there still exists a need for a winter-hardy type having good fruiting characteristics.

Eighteen varieties have been tested during the past five years and at present thirteen types are in an observational test. Of the thirteen, five are from Morden, Manitoba, and may possibly have the desired winter hardiness. The varieties Viking and Newburgh are still recommended for the more favorable growing areas, and the variety Trent because of its hardiness is of value in the less favored areas of the province.

Raspberry and blackberry breeding

Since 1953, 3,083 raspberry seedlings have been produced from varietal and inter-species crosses. Seven selections were made from a group of 840 seedlings which fruited in 1956. Varieties or species having factors for hardiness have been employed in nearly all these crosses.

In 1956 seedlings from the intercrossing of eleven red raspberry varieties were placed in replicated randomized plots for a study of varietal combining ability. The varieties having the best general and specific combining ability will be utilized in further breeding experiments.

The principal species being used in the *Rubus* breeding program are *Rubus acaulis*, *R. arcticus*, *R. chamaemorus*, *R. canadensis* and *R. alleghensis*.

Grapes

Variety testing

Twenty-two varieties of grapes were tested in an observational plot which was removed in 1955. None of the varieties tested were entirely suitable for this area although Fredonia (blue), Van Buren (blue), Ontario (green) and Portland (green) are of value for home gardens and limited commercial trial.

The new grape variety observational trial plot was established at this Farm in 1953. Fourteen new introductions including four French-American hybrids are now under observation in this trial.

Grape breeding

An earlier maturing productive blue grape is required for this area. Commercially acceptable varieties which mature in other areas of Canada fail to mature in Nova Scotia due to the lack of heat during the growing season. There are, however, a number of varieties which mature their fruit each year but because of low production or poor fruiting characteristics are commercially unacceptable. These varieties have been used in a breeding program initiated in 1953. Approximately 1,000 seedlings have been produced from these parents and a number of these seedlings will fruit in 1957.

NATIVE FRUITS

(E. L. EATON)

Blueberries

Highbush blueberries have now been grown at Kentville for thirty years. The original block, set in 1926, is still vigorous and productive. The few gaps occurred rather early in the project but no plants have died recently. During this period neither insecticide nor fungicide has been necessary. Both highbush and lowbush blueberries serve as alternate hosts for the rust of the balsam fir, *Calytospora goeppertiana* and mild infections have been easily removed by pruning. The crowns of a few plants have been invaded by this fungus, causing some loss of vigor. No remedy, other than pruning, is known. In 1956 one Pioneer plant yielded 49 pints. The highest previous yield was 43 pints from one Adams plant in 1954. It is evident that the highbush blueberry can be grown successfully on the soils and in the climate of this area of Nova Scotia.

Blueberry breeding

The Kengrape variety has been distinguished by the squat, wide shape of the bush. Under the most favorable conditions at Kentville none has exceeded

four feet in height. However, the many crooked branches make it difficult to prune. The berry is large, has a fair scar and color but lacks flavor. A major aim of the breeding program has been to secure a low, wide bush that would be easier to prune, have a larger yield and better fruit characters. Very few of the Kengrape progeny possess a good scar but several plants, promising otherwise, are being multiplied for further study.

More recently a search has been made for highbush blueberries that may spread underground. None of these have been found in highbush seedling populations. The F_2 population of highbush \times lowbush contains a few plants that are suckering below ground but other plant and fruit characters, so far observed, are inferior to the highbush parents.

A suckering highbush form, *V. constabulaei*, from the mountains of Carolina, appears to be hardy at Kentville. This species is a hexaploid ($2n = 72$) whereas most of the northern highbush varieties are tetraploid ($2n = 48$) and the lowbush types are either tetraploid or diploid ($2n = 24$). So far crosses of *V. constabulaei* with the other species have been fruitless.

Blueberry propagation

The successful rooting of highbush blueberry cuttings under 50 per cent lattice shades on the undisturbed sphagnum peat at Aylesford in 1950 and 1951 led to a test at Kentville comparing lattice covers with the usual tight sash and burlap shade over frames filled with granulated peat. In each test the lattice was equal or superior and mold has been much less serious. On unusually hot, humid days it has been necessary to remove the lattice covers but otherwise the only attention needed has been an occasional watering. Peat placed directly on gravel soil dried out more quickly than when suspended in wire bottom trays.

Highbush blueberry culture

Annual pruning and fertilizing with sawdust mulch, and clean cultivation until July followed by an annual cover crop of weeds or oats has been the preferred cultural treatment at Kentville.

In 1950 a replicated test was begun in which peat and sawdust beneath the plants were compared with the same materials as a surface mulch. One barrel of each material per plant was used. Those receiving peat as a surface mulch made the least growth, those with no mulch were slightly better, while those which received sawdust on the surface, sawdust below the plants and peat below were the best, and the plants showed about equal benefit.

Cranberries

An early ripening cranberry collected from a mixed population on the bog of Mr. Charles Wyman of Beaver River, Digby County, Nova Scotia, was introduced in 1955 under the name Beaver. A new section of bog at Aylesford has been planted as a multiplication plot and small plantings for the same purpose have been made at Middle Stewiacke, Nova Scotia and Alliston, Prince Edward Island. The variety is a week earlier than Early Black and possesses better fruit characters.

Reciprocal crosses have been made with Beaver and Early Black in the hope of combining the false-blossom resistance of the Early Black with the good fruit qualities of the Beaver.

Elderberries

Two varieties of purple-fruited elderberries are being introduced under the names Victoria and Kent. Both of these are open pollinated seedlings of

Adams, and are equal to it in berry size but earlier. In the cool, backward summer of 1956 Kent ripened a few days before Victoria. Blossom time of the two varieties overlaps enough for pollination.



Figure 3. Inflorescences in full bloom of the purple elder *Sambucus canadensis* (left) and a late-flowering individual hybrid (right) from a cross with the red elder *Sambucus pubens*.

An attempt in 1951 to cross the purple elder, *Sambucus canadensis* L. with the red fruited *Sambucus pubens* Michx. yielded a small number of seeds. Of the few plants grown from them, none were believed to be true crosses. In 1953 a larger number of blossoms of Victoria were emasculated and pollinized with pollen from the red elder. The plants resulting from this cross are all intermediate in type between the two parents (Figure 3). Many have blossomed and set a few fruits but so far no viable seed has been produced. It is hoped that treatment with colchicine may induce fertility.

VEGETABLES

(E. W. CHIPMAN)

Variety Trials

Corn.—One hundred and eleven varieties of corn have been tested in the observational trials for field performance and fresh and canned quality. From these tests the following are recommended on the basis of their general performance (in order of season): Improved Spancross, Seneca 60, Golden Beauty, Golden Rocket, Miniature, Carmelcross, Seneca Golden, Golden Hybrid-G101, Seneca Chief, Wonderful.

Twelve varieties were further tested in advanced trials for yield and canning quality from which the following are recommended: Tendergold, Seneca Golden, Seneca Arrow, and Mellogold.

Leafy Vegetables

Broccoli.—Of the twenty-one varieties and strains of sprouting broccoli tested the following are recommended: Waltham 29, Green Mountain.

Cabbage.—Twelve varieties of green cabbages were tested, from which the following are recommended:

Early—Golden Acre strains

Midseason—Glory of Enkhuizen, Bonanza

Late—Danish Ballhead

Many of the newer varieties being developed are resistant to yellows; however since we are not troubled with this disease they would have value only if they are better than some of the older existing ones. To date we have not found this to be so.

Cauliflower.—Fifteen varieties and strains of cauliflower were tested from which the following are recommended:

Early—Snowball A, Super Snowball

Main crop—Snowdrift, Perfected Snowball

Celery.—Twelve varieties were tested on an irrigated sandy loam soil and the following are recommended:

Green—Utah 15, Utah 16-11

Golden—Golden Plume

Lettuce.—Thirty-six varieties of crisp heading and five butterhead varieties were tested, and the following are recommended:

Crisp Head—Premier Great Lakes, Great Lakes No. 428

Butterhead—Salad Bowl

Effect of depth of transplants on heading in lettuce

To study the effect on heading when the transplants are set deep (one inch below crown) and at crown level, a four-replicate randomized block experiment was set up.

Considering earliness of heading it was found that deep set plants were quicker to mature but weighed less than the normal set ones. They were also longer (polar diameter) and narrower (equatorial diameter). From the total marketable heads it was also found that there was significant increase in mortality in the deep set plants.

Leguminous Vegetables

Bush Beans.—Wax Podded—Of the thirteen varieties tested, Sensation Wax, Kinghorn Wax and Puregold Wax are recommended.

Green Podded—Twenty-five varieties were tested in the observational trials from which seventeen were placed in advanced trials for yield comparisons and canning rating. Contender, Seminole, Slendergreen and Processor are recommended varieties for canning.

Pole Beans.—Six varieties of green podded pole beans have been tested from which Blue Lakes (F.M. Strain) and Blue Lakes Number 65 are recommended.

Field Beans.—Fourteen varieties of field beans have been tested of which ten have been grown in advanced trials for yield comparisons and ripening habit. Kenearly Yellow Eye, Clipper (white pea bean) and Lapin (white) appear to be the most promising. K 53, an X-ray mutant from Kenearly Yellow Eye, which it resembles in shape, is white with a very small light brown spot at the eye and appears quite promising as an early maturing variety.

Peas.—Thirty varieties of peas have been grown in the observational trials out of which five were considered to be freezing types. The most promising garden varieties were Fenland Wonder, Meteor, Early Abundant,

Lincoln, Ottawa P.E.7, and Wando. Among freezing varieties, Pluperfect and Victory Freezer are recommended.

Nine varieties of canning peas were grown in an advanced trial to compare yields and canning quality. Perfection and Resistant Famous are recommended.

Perennial Vegetables

Difference in yield of male and female asparagus plants.—To show the differences in yield between pistillate (female) and staminate (male) plants, seedlings of the variety Eden were segregated and planted in separate plots. After five years cutting the superiority of the staminate plants was quite evident.

Table 8.—Asparagus yields, pistillate and staminate plants.

Plant type	Yield 1952	Yield 1953	Yield 1954	Yield 1955	Yield 1956	Yield Total
	lb.	lb.	lb.	lb.	lb.	lb.
Pistillate.....	7.4	5.2	4.3	7.8	8.1	32.8
Staminate.....	15.3	12.6	11.5	18.9	16.8	75.1

Rhubarb.—Ten varieties of rhubarb have been tested with the object of finding a high quality red-stalked rhubarb adaptable to this locality. Macdonald, Valentine and Sunrise are recommended.

Nine varieties have been forced during winter months and samples cooked and rated by Processing Laboratory (Figure 4). From this test Valentine and Sunrise were given the highest rating.

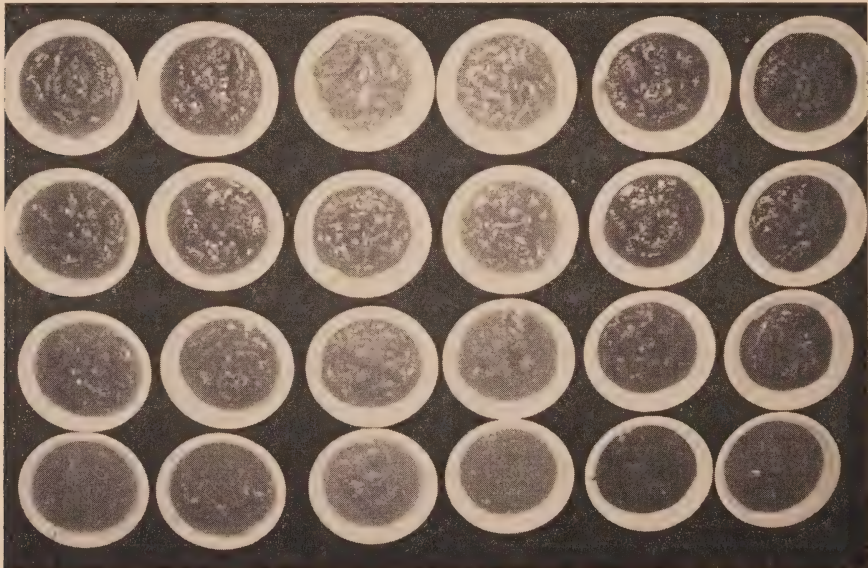


Figure 4. Comparison of varieties of rhubarb made into sauce. Varieties (left to right): Valentine, Sunrise, Strawberry, Jersey, Ruby, Macdonald. Methods of handling (top to bottom): Forced, Frozen as sauce, Frozen with sugar, Frozen without sugar.

Comparing different methods of handling the roots prior to forcing, it was found that a storage period of 14 days at 33°F, 24 hours at 0°F. and another

14 days at 33°F. gave a significant increase in yield over other methods. Where cold storage facilities are available this method might be used to grow an earlier forced crop.

Root Vegetables

Carrots.—Seventeen varieties of carrots were grown in the observational trials from which five (Gold Spike, Gold Pak, Imperida, Long Imperator and Nantes Special Long) were selected for advanced trials. These were grown on ridged and flat rows and pulled at three different pulling dates (94, 125, 155 days).

Results indicate that the most desirable grade of carrots, a long tapering type, was obtained when the crop was grown on a ridged row and pulled at 94 days. Where the carrots were pulled at a later date the size and amount of cracking increased.

Although the varieties Gold Pak and Gold Spike appeared to produce the most desirable root type, yields were low and amount of cracking was very high. Long Imperator when grown on a ridged row and pulled early was the most satisfactory carrot of those tested.

Beets.—Fifteen varieties of beets were on trial from which the following are recommended: Asgrow Canner, Detroit Dark Red and Perfected Detroit.

Onions.—Within the past five years hybrid onions have become increasingly more important. In the trials there were 6 varieties and 43 F₁ hybrids. From these the following are recommended: Autumn Spice, Epoch, Encore, Spotlight.

Sweet Potatoes.—During the seasons of 1955 and 1956 sweet potatoes were grown with some success. The roots were started in the greenhouse the first week of April and rooted shoots from these were set in the field the first of June. Roots were dug after the first killing frost in September. Of the seven varieties on test Ranger and Red Nancy appear the most promising.

Solanaceous Vegetables

Tomatoes.—In the variety testing of tomatoes the main objective has been to obtain an early productive variety, the fruit of which is smooth and of suitable marketable quality. One hundred and forty-eight varieties have been tested in the observational trials from which the most promising have been placed in the advanced trials. Promising varieties arranged in order of season are: Scotia, Fireball, Meteor, Harrow, Early Hybrid and Quebec No. 5. For the production of green pickling fruit Stokesdale and Quebec No. 5 are very good.

Peppers.—Twenty-two varieties of sweet peppers have been tested of which Vinedale and Pennwonder are the most promising. Heifferhorn and Long Thick Red were the best hot peppers from a test involving six varieties. In favorable years all these varieties will yield a small amount of ripe (red) fruit.

Vine Crop Vegetables

Cucumbers.—Seventeen varieties and ten hybrid slicing cucumbers were tested from which the following are recommended: Marketer, Niagara, Burpee Hybrid, Sensation Hybrid. Where scab or spot rot (*Cladosporium cucumerinum*) is a problem the variety Highmoor is recommended.

Twenty-nine varieties of pickling cucumbers were also tested. For this area where scab may be a severe problem and mosaic has been occasionally found varieties which are resistant to these diseases should be used. W.S.M.R. No. 12 (Wisconsin Spot Rot Mosaic Resistant No. 12) is the most desirable.

Melons.—Fourteen varieties of muskmelon were tested for earliness and quality from which Sugar Salmon, Golden Champlain, Pennsweet and Burpee Hybrid, were considered to be superior.

Eighteen varieties of watermelon were tested with New Hampshire Midget, Early Canada and Sweet Sensation being the best.

Squash.—Of the twenty-two varieties of squash tested for yield, size and eating quality the following are recommended: Buttercup, Blue Buttercup, Baby Hubbard and Sweetkeeper. Buttercup rated the highest in cooking quality.

Vegetable Breeding

Onions.—An early maturing globe-shaped onion would be desirable for this area. With this objective in mind, crosses were made between Kenearly (an early flat type) and the Utah and Riverside strains of Sweet Spanish (late, globe type). Selections within these crosses have been made down to the F₅ generation.

In 1952 thirty lines of Kenearly were selected from early blooming seed bulbs. From these, further selections based on shape index of the bulbs have been made. The object has been to obtain an earlier maturing strain of the normally flat Kenearly that will be more nearly globe shaped.

Male-sterile lines obtained from the U.S.D.A. have been crossed with Kenearly for the production of F₁ hybrids. Two of these 2264A × Kenearly and 5546A × Kenearly show some promise.

Tomatoes.—Continuing the tomato breeding project for the development of new hybrids and varieties which are more adaptable to this area, a total of 168 crosses were made and tested. From these 47 were carried to the F₂, 21 to the F₃, 8 to the F₄ and 5 to the F₅. In addition numerous backcrosses were also made.

As a result of this work the following early selections appeared promising and were quite widely tested:

K49.—Determinate plant. Fruit medium to small, uniform ripening, some roughness. Discarded after a semi-commercial test.

K51.—Determinate plan. Fruit medium size, non-uniform ripening, inclined to be slightly soft and rough. Generally well accepted.

Two other selections were named in 1956 and are at present being distributed:

Scotia.—Determinate plant. Fruit medium size, non-uniform ripening, smooth. The most productive early tomato in the advanced trials.

Ken.—Very dwarf plant. Fruit medium to large, uniform ripening, semi-flattened with some blossom-end scar. Selected as a distinctive backyard garden type.

Blight Resistance

In 1952-53 twelve segregating late-blight-resistant strains of tomatoes were received from New Hampshire. Although these were generally poor horticultural strains, selections were made and seed was sent to Fredericton and Ottawa to determine their resistance to blight. Findings from these tests indicated considerable promise and the best resistant strains were carried forward to be crossed with acceptable horticultural varieties.

In order to test further the progeny of the crosses and other selections, inoculation of seedling material was carried out at Kentville with the assistance of the Plant Pathology Laboratory. During the winter of 1955-56, using unselected strains of the blight organism, *Phytophthora infestans*, fifty-three crosses and selections were inoculated. Twenty-three of these showed resistance and were carried forward to the field in the summer of 1956. From these, twelve showing field blight resistance and producing fruit of horticultural value, have been further checked for blight with the Strain 1.4. *Phytophthora infestans* (Figure 5). Results indicate five lines which show marked resistance.

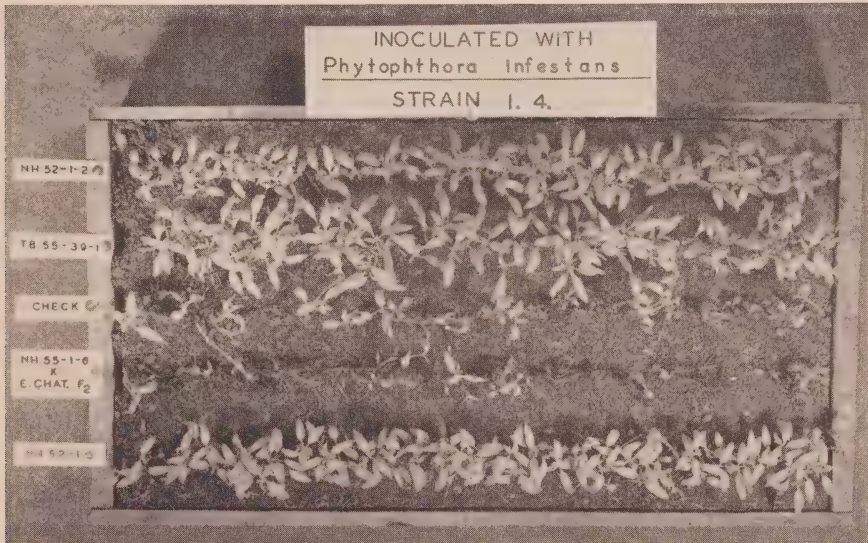


Figure 5. Young tomato seedlings following inoculation with late blight (*Phytophthora infestans*), showing two susceptible and three resistant breeding lines.

At present resistant plants from these lines are being grown, and it is hoped that it may soon be possible to release a horticulturally acceptable variety with resistance to certain physiological races of *Phytophthora infestans*.

Peppers.—Using the varieties Vinedale, Earliest Red Sweet, Pacemaker, Merrimack Wonder and Pennwonder as parents, a number of F_1 hybrids were produced. Selections from the F_2 and F_3 have been made and are being compared with the original parents for the production of early red peppers.

Preliminary Studies with Acid Peat and Muck for Vegetable Production

(E. W. CHIPMAN AND D. C. MACKEY)

Using the Caribou Bog at Aylesford, a typical sphagnum peat dome bog with an area of 621 acres, work was commenced in 1952. Pot work in the greenhouse with five vegetable crops, celery, potatoes, spinach, cabbage and carrots, has established the optimum pH levels for these soils. (See Table 9).

In the field, difficulties were encountered in getting the actual pH reading to conform to the theoretical values based on the amount of lime applied. The main problem was to get the lime uniformly mixed to a depth of 10 to 12 inches. However, to obtain pH values of about 5.0, at least 6 tons per acre of ground limestone was required.

Table 9.—Pot yields (ounces) of crops grown on muck soil at different pH levels.

Crop	Approximate pH values					L.S.D. p=0.05
	3.4	4	5	6	7	
Spinach.....	6.5	20.0	19.5	13.0	....	....
Potatoes.....	117.0	147.0	153.5	111.5	....	....
Celery.....	....	18.8	21.7	24.9	24.7	1.4
Cabbage.....	....	9.7	12.5	9.6	10.4	N.S.
Carrots.....	....	7.9	8.7	7.8	4.0	1.1

Field crops in 1953 were potatoes, spinach, lettuce, cabbage, cauliflower, celery and spearmint. The potatoes grew well, yielding on the basis of small plots at a rate of 850 bushels to the acre. The other vegetables failed to develop satisfactorily, showing a variety of symptoms, one of which appeared to be a boron deficiency.

A greenhouse pot experiment with spinach and celery was used to study the trace-element requirements of these soils. Elements checked were boron, manganese, magnesium, copper, salt NaCl, molybdenum. A deficiency of boron was shown to exist (see Table 10), but no other lack of minor elements was detected.

Table 10.—Yields of celery from borax-treated pots

Treatment	Mean yield (oz.)
No borax	6.4
10 lb.	12.0
15 lb.	11.0
20 lb.	12.3
25 lb.	13.5
30 lb.	15.1

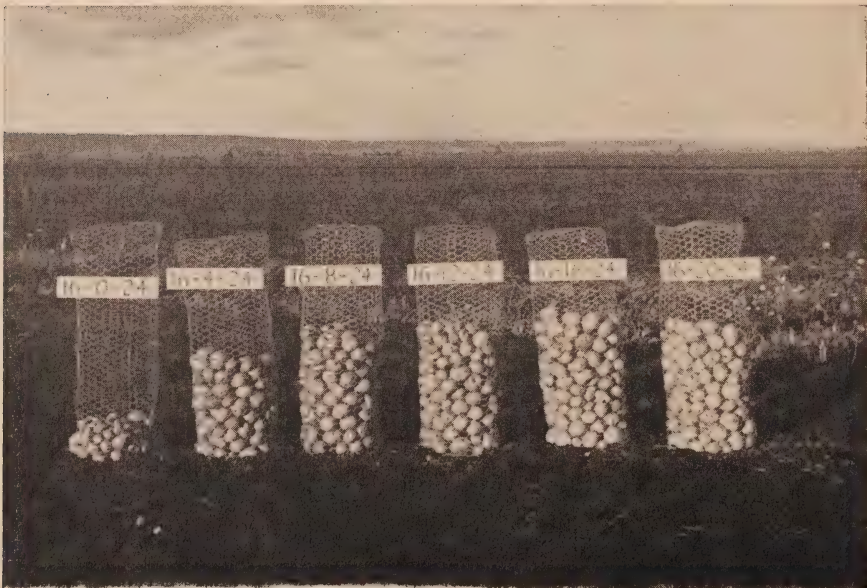


Figure 6. Yield response of potatoes to phosphorus when grown on peat soil. (All formulas were applied at the rate of 1 ton per acre.)

At present the NPK requirements of potatoes and onions are being studied. Tremendous response has been obtained from the addition of small amounts of phosphorus but only slight increases were obtained from more than 160 lb./acre of P_2O_5 . (Figure 6).

The requirements indicated are for a formula relatively high in nitrogen supply and medium to low in phosphorus and potash.

STORAGE AND PLANT NUTRITION

(C. A. EAVES AND D. C. MACKEY)

General

During the past five years the section has been closely associated with the commercial development of controlled atmosphere or gas storage and the increased production of small fruits and vegetables with the aid of sprinkler irrigation. The addition of a soils specialist Dr. D. C. MacKay to the staff has enabled the section to pay closer attention to crop fertility problems and analytical procedures have been greatly accelerated by the acquisition of a flame spectrophotometer.

Controlled atmosphere storage

These investigations may be divided into three phases (1) varietal reaction to various atmospheres (2) construction problems (3) service to commercial operators.

1. Varietal trials using various concentrations of carbon dioxide and oxygen at different temperatures have resulted in the following recommendations:

Variety	Gas mixture	Temperature
McIntosh	7 per cent CO_2 + 14 per cent O_2	38°
N. Spy	7 per cent CO_2 + 14 per cent O_2	32°
Delicious	*3 per cent CO_2 + 5 per cent O_2	32°
Red Rome	*3 per cent CO_2 + 5 per cent O_2	32°

*Stores scrubbed to remove excess CO_2 .

Maturity has an influence on the quality of McIntosh fruit in gas storage as shown in Table 11. Core browning is more prevalent in the early picked apples and their flavor is inferior. Attention is drawn to the great reduction in rot development and increased firmness resulting from this method of storage. The small difference in quality of the apples picked on October 6 and placed in the two gas mixtures, indicates that there is little to be gained with the McIntosh variety by removing the carbon dioxide in order to maintain low levels of both CO_2 and O_2 .

Table 11.—Influence of maturity on keeping quality of McIntosh apples stored in various atmospheres at 38°F and examined May 22, 1954.

Date picked	Treatment	Hardness lb. pressure	Per cent rot	Per cent core flush	Flavor	Appearance
22/9.....	Air.....	8.9	33.1	100.0	None	Shrunken
22/9.....	7% CO_2 + 14% O_2	10.3	0.0	28.0	Fair	Good
28/9.....	Air.....	9.0	40.0	70.0	None	Poor
28/9.....	7% CO_2 + 14% O_2	10.0	0.6	4.0	Good	Very good
6/10.....	Air.....	8.5	66.0	38.0(sl)	Poor	Poor
6/10.....	7% CO_2 + 14% O_2	9.2	0.0	20.0(sl)	Good	Very good
6/10.....	5% CO_2 + 5% O_2	10.0	5.1	10.0(sl)	Fair	Good

The varieties Cortland and Wagener have been gas stored with much less success and this type of storage cannot be recommended for them at the present time.

Construction

The conversion of existing cold rooms has provided a variety of problems including protection of insulation and structural members from dry rot and the type and method of application of gas proofing materials. A new light weight laminated door has been designed and constructed and also a scrubber for economical removal of carbon dioxide. These are shown in Figure 7 and plans for these may be obtained from the Experimental Farm.

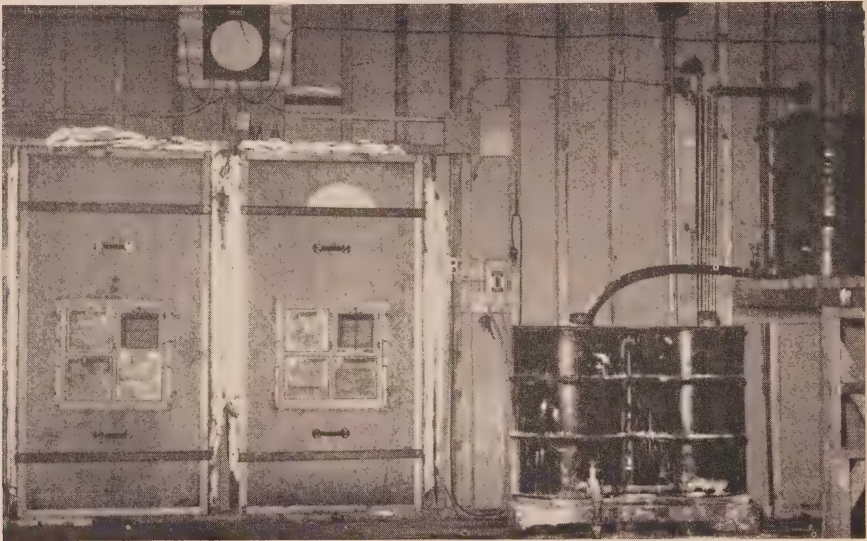


Figure 7. Experimental scrubber used on a commercial gas storage for apples. Note light weight laminated wood doors.

Service

Close attention has been paid to the operation of the new stores in the Valley area which in 1956 had a capacity of approximately 40,000 bushels. Recording temperature controllers have been installed in some of these storages. Gas analysis has been accomplished by means of a "Fyrite" flue gas analyser and regularly checked with an Orsat apparatus.

Nutritional Survey of Commercial Orchards in Relation to Keeping Quality

This investigation is long-term in character and the first phase which was based on samples of leaves, fruit and soil taken from around one tree in each of 15 commercial orchards, has now been completed.

In an attempt to relate nutrient levels in the leaves to those in the soil, correlation coefficients were determined. Only one significant correlation was found, that between the potassium content of the soil and the leaves with a correlation coefficient of $+0.401$.

An examination of the relationship between various factors associated with storage quality and leaf nutrients (Table 12) showed significant negative correlations between fruit color and the N/K ratio and between fungal rotting and the calcium content of leaves.

Table 12.—Storage quality of McIntosh apples as related to nutrient levels in the leaves.

Factors examined	Correlation coefficient
Core flush × nitrogen.....	0.249
Core flush × phosphorus.....	0.227
Hardness × nitrogen.....	−0.150
Hardness × N/K ratio.....	0.073
Quality × N/K ratio.....	0.054
Color × N/K ratio.....	−0.421*
Color × nitrogen.....	−0.212
Fungal rots × nitrogen.....	0.198
Fungal rots × calcium.....	−0.493*

*Significant at 5% level.

Head Lettuce Nutrition

Production of this crop has increased considerably during the past few years, and although the total acreage grown is still fairly small, with its natural adaptability to this climate head lettuce will undoubtedly be of increasing importance in the future.

Phosphorus

Nine different experiments conducted over a three-year period have indicated conclusive yield responses to phosphorus in all except one case (Table 13). In addition, adequate phosphorus fertilization has produced firmer heads.

Table 13.—Mean yields (tons/acre) of head lettuce with different rates of phosphorus fertilizer.

Rate of P ₂ O ₅ lb/acre	Mean yields, three locations		
	1954	1955	1956
0.....	8.4	....	6.5
100.....	....	16.9	....
150.....	....	....	8.7
180.....	9.9	....	....
200.....	....	17.4	....
300.....	....	17.2	10.1
360.....	10.1	....	....
400.....	....	15.9	....
450.....	....	....	10.4

As might be expected, the most desirable rate varied considerably, but on the average at least 200 to 300 lb/A of P₂O₅ would appear to be necessary. Since in all experiments phosphorus was applied and mixed into the drills where the plants were set, if broadcast applications were used they would

need to be considerably greater. That many commercial fields are receiving insufficient phosphorus is indicated by a comparison of the leaf analyses associated with maximum experimental yields and those obtained in samples from growers fields in the area (Table 14).

Table 14.—Concentration of soluble leaf P (ppm) associated with maximum yields.

	1954	1955	1956
Experiment 1.....	70	70	60+
Experiment 2.....	..	95	80
Experiment 3.....	..	85	..
Growers mean.....	57	66	
Growers range.....	31-80	40-106	

From these results, 75 p.p.m. in the lower leaves, at the stage when heading is just starting, is suggested as a critical concentration.

Nitrogen

The results obtained from different rates of nitrogen application have been less conclusive. In some cases yields have actually been reduced from applications of ammonium nitrate (Table 15), in particular from sidedressings. In all experiments except those of 1954, nitrogen was applied broadcast, because burning of the roots occurred from row applications, even when mixed or covered with soil.

Table 15.—Mean yields (tons/acre) of head lettuce with different rates of nitrogen fertilizer.

Rate of N lb/acre	Mean yields, three locations		
	1954	1955	1956
0.....	....	....	5.9
33.....	10.2	15.6	....
50.....	....	....	8.8
100.....	....	17.5	10.5
200.....	10.1	16.6	10.7
300.....	....	18.0	10.6
400.....	8.0	....	....
500.....	....	16.7	....

These experiments suggest that on most fields 100 lb/A of nitrogen is sufficient, and that most, if not all of this may be applied broadcast and harrowed into the soil before planting. Although the literature cautions against the effect of too much nitrogen in producing soft heads, this has not been a problem in our experiments. Furthermore ample nitrogen has appeared to be necessary for crisp tenderness and full flavor.

Potato Nutrition

The potato has constituted an important crop in Nova Scotia for many years but it is only recently that any studies have been made regarding

nutritional problems specific to this area. In many regions potato growing is a specialty but with most growers here, the crop forms only a part of a mixed-farming program. Because of this fact and the variety of soil conditions encountered, experimental results have often been inconsistent. This was illustrated in the results of two series of experiments carried out in 1955 and 1956 (Table 16).

Table 16.—Mean potato yields from fertilizer experiments, 1955 and 1956

Year	Yields with different formulas			
	Bu/acre	Per cent of yield with balanced formula		
		5-10-13*	0-10-13*	5-0-13*
1955 (8 locations).....	333	....	86.6	89.4
1956 (11 locations).....	402	66.9	94.8	83.5

*Applied broadcast at rate of 3000 lb./acre.

Furthermore, while phosphorus was more often limiting yields than potash in 1956, the opposite was true in 1955 and also in earlier work*. In 1956, the only year in which nitrogen treatments were included, this element was the most critical of all.

These results emphasize the necessity for some method of estimating fertilizer needs of this crop for individual farms. A study is presently under way in co-operation with the Chemistry Section, Science Service Laboratory, to establish the relationships between the soil test values for these three major elements and crop response. Leaf analyses are also being investigated as a supplementary or alternative procedure.

*Eaves, C. A. and J. S. Leefe. Proc. Amer. Soc. Hort. Sci. 62:377-383. 1953.

Irrigation and Nutritional Studies on Sandy Soils

An investigation has been in progress since 1953 to examine the possibilities of utilizing, for vegetable production, large acreages of sandy and gravelly soils located in the floor of the Annapolis Valley. Nutritional experiments on these soils constitute "sand culture control" under field conditions, so that the studies are also providing basic information on the nutritional and water requirements of various crops.

Preliminary studies indicated that although supplementary irrigation during dry spells increased crop yields, nutrient levels in the plants were often reduced. These results suggested that irrigation caused serious leaching losses, and that split applications of fertilizers might be preferable to the usual all-at-planting practice. From later work, however, it has appeared that the greater demands on the available nutrients have accounted for the lower plant levels under irrigation, and that sufficient fertilizer for the full growth of the crop could be advantageously applied at planting.

Table 17.—Average yields of irrigated sweet corn and potatoes with two methods of fertilizer application.

	Split applications	All at planting
Sweet corn (unhusked ears, tons per acre)	3.64	4.00
Potatoes (bushels per acre)	300	311

The importance of adequate soil moisture for increasing the effectiveness of applied fertilizers and in improving crop yields is illustrated in Table 18. In addition, filling of ears and kernels were often greatly improved by irrigation. In spite of this demonstrated value of irrigation the 1954 and 1955 crops recovered surprisingly well after periods of drought, so in 1956 a "minimum irrigation rate" was included as an additional treatment. Since the time from flowering to ear filling appeared to be particularly critical, this minimum treatment supplied additional water during that period only.

Table 18.—Yields of marketable sweet corn (tons of unhusked ears per acre) as influenced by irrigation and fertilizer practices.

Irrigation treatment	Av. water added	1954 yields		1955 yields		1956 yields	
		Low fert. ¹	High fert.	Low fert.	High fert. ¹	Low fert. ¹	High fert. ²
None.....	in. 0.0	3.01	4.00	4.39	3.94	4.78	5.05
"Minimum".....	2.0	....	....	....	....	4.20	5.82
"Optimum".....	6.0	2.94	5.12	5.29	6.70	4.24	6.04
"Excess".....	12.0	....	....	6.45	7.84	4.08	6.22

¹Approx. 1000 lb./acre of 6-12-6.

²Approx. 2000 lb./acre of 6-12-6.

FRUIT AND VEGETABLE PROCESSING

(G. W. HOPE)

Effect of Nutrition on Chipping Quality of Netted Gem Potatoes

In the commercial manufacture of potato chips the dry matter and reducing sugar content of the tubers are important factors, influencing yield and quality respectively of the finished chips. Reports in the literature that fertilizer components may affect chip quality prompted an investigation of phosphorus and potassium applications.

The effect of muriate of potash was investigated in 1952 and 1953 and was found to be two-fold, there being a positive correlation between potash content of the tissue and reducing sugar and a negative correlation between chlorine content and reducing sugar. A negative correlation was also found between dry matter content of the tuber and chlorine level in the green tissues.

In neither year was there any demonstrable association between nutritional levels and chip color.

In 1955 Netted Gem potatoes were grown in eight scattered locations on different soil types, and a three-plot experiment was set up in triplicate on each farm. The central plot of each replicate received 3,000 pounds of 5-10-13 fertilizer, the other two receiving equivalent amounts of 5-0-13 and 5-10-0, respectively.

Greater differences in specific gravity, reducing sugar and chip color were found between farms than between treatments, the differences in reducing sugar between treatments being barely significant. Tubers from plots receiving muriate of potash had a lower specific gravity, and gave chips of more desirable color than those receiving none. No such effect could be demonstrated for the plots receiving phosphorus.

Highly significant negative correlations were found between specific gravity and phosphorus content of the leaves and between reducing sugar and

chip color of the tubers. Significant positive correlations were found between both phosphorus and nitrogen content of the leaves and reducing sugar of the tubers.

On the basis of three years' results it would appear that reducing sugar content of the tubers tends to be positively correlated with potassium and nitrogen content of the growing plant and that dry matter of the tubers tends to be inversely correlated with the potassium content. However, the effect of fertilizer application is secondary to some effects of location, such as soil type, general soil fertility, or crop management.

The Relationship of Yield to Quality in Canning Peas

Both immature, grassy flavored peas and those which are hard and starchy are unacceptable to the cannery. Between the two extremes lies a range of maturities of varying desirability. Since there is, during this phase, an increase in the yield per acre because of increase in the size of the individual peas, the harvest date which ensures the highest yield of first quality peas is not readily determined.

The relationship between yield and quality was studied co-operatively by the Field Crops and Processing Sections over a three-year period. Statistical analysis indicates that in all three years the factor affecting both yield and hardness was the time from planting to harvest. This factor was also shown to affect the percentage of "usable peas", those of size 3 or larger.

Variance analysis of the 1954 and 1955 data indicated a probable linearity between time and yield, time and hardness or time and percentage of usable peas. In 1956, with more harvest dates, it was possible to show that a highly significant linear association existed.

The gain in yield for each unit increase in texturemeter reading was found to approximate 1.1 per cent of the mean yield.

Comparison of Methods for Measuring the Solids Content of Apple Juice Concentrate

Some confusion exists in defining the degree of concentration of apple juice concentrates. This is usually indicated by the Brix, Baume or specific gravity spindle reading or by the percentage of soluble solids as indicated by a sugar refractometer.

Over a period of two years forty samples of depectinized, filtered concentrate of French, Nova Scotia and British Columbia manufacture were each evaluated by the different instruments, and results converted to soluble solids, using the International Sugar Tables. All four methods differed statistically from the determination by evaporation, with the refractometer method differing most widely.

The two most commonly used methods of measurement are the Baume spindle and the sugar refractometer. In all forty samples examined the Baume values exceeded those found by refractometer.

Ripening of Windfall Apples for Processing

In 1954 firm, sound windfall apples were collected following the hurricane of September 12 and stored in open containers at a storage temperature of 65°F. At three-day intervals samples were withdrawn and examined for titratable acidity, percentage soluble solids, disappearance of starch and changes in flavor.

The varieties McIntosh, Cortland, King, Red King, Wagener, Golden Delicious and Cox Orange ripened sufficiently to be used for solid-pack canned apples by mid-October or before. Ribston was found to follow closely the ripening trends of Cox Orange. Golden Russet while thought to be too high in acid, was canned in October and sold successfully by a local firm. The quality of canned apples prepared from windfalls was generally much below that from picked apples because of the astringent or "green apple" flavor. The same criticism was made of the juice, which in addition tended to be flat and watery. King and Cortland were found satisfactory for sauce in early October and Ribston about the middle of the month. By October 15 Cortland was getting too soft to can. King was starting to deteriorate but was still usable and Wagener was giving trouble because of uneven ripening.

The later varieties Rome Beauty, Delicious, Fameuse, Red Spy, Ben Davis, Gano and Northern Spy remained too acid or astringent (or both) for manufacture into canned products but Baldwin, Stark and Blenheim were usable for solid pack in early November.

Varietal Trials

Freezing

In the freezing of broccoli no difference in quality could be observed between florets packed in Thermorex containers or in polythene bags except that the latter permitted the stems to be left longer ($3\frac{1}{2}$ -4 inches). Propageno Early, Waltham 29 and Freezer all gave an excellent product.

The corn varieties F-M Cross, Carmelcross, Cream O'Gold, Gold Rush and Calumet were found to freeze well as corn-on-the-cob. Blanch times of not less than six nor more than ten minutes in steam were found desirable with $7\frac{1}{2}$ minutes the best for most cobs. Rapid freezing was found necessary to prevent the kernels becoming water soaked, soggy and flavorless.

For freezing strawberries, the whole-berry dry sugar pack was found more acceptable than either the syrup pack or sliced berries packed in syrup or dry sugar. The most popular proportion of berries to sugar was found to be 3:1. The varieties found most suitable, in order of preference were Sparkle, Premier, Pathfinder, Temple and Catskill.

Canning

In canning trials the wax bean varieties Sensation, Kinghorn and Pure Gold were found to be excellent in appearance and of good quality. A number of green varieties including Topcrop, Tenderlong, Slendergreen, Tendergreen, Rival, Processor and Siminole also were found satisfactory.

The pear varieties Russet Bartlett, Cayuga and Flemish Beauty were found to approach more closely the quality of Bartlett than any of the other twenty-three varieties tested.

Tomatoes grown in Nova Scotia tend to be unsatisfactory for canning because of lack of red color and high acidity. Previous assessments of varieties as canned tomatoes or tomato juice have been unsuccessful for this reason. The two varieties K51 and Scotia were shown to be of sufficiently good color but were a bit more acid than tomatoes canned in other provinces. The vitamin C content of juice made from these varieties was moderately good (15-17 mgm/100 ml.)

In a comparison of methods of measuring maturity in canning corn, moisture measured by the Steinlite moisture tester and moisture by the standard oven method gave a correlation coefficient of 0.915. The correlation between

moisture by vacuum oven and percentage alcohol-insoluble solids was $-.927$. A significant correlation (.693) was found between moisture by oven and turbidity.

Varieties recommended for canning in Nova Scotia include Seneca Arrow, Mellogold, Seneca Golden, Golden Hybrid, Asgrow Golden 25. Golden Cross Bantam and Tendermost are excellent but late in season.

Analysis made on seventeen varieties of cherries showed no relationship between the tannin/sugar ratio and the flavor rating allotted by a taste panel.

Attempts to make wines from locally grown grapes met with little success because of the low-sugar, high-acid ratio in all varieties tested. Additions of sucrose to the fermenting musts improved alcohol content, but did not counteract the sharpness in flavor. Grape jellies and juices were also too acid to be attractive.

Comparison of Potato Varieties for Chipping Quality

Samples of potato varieties which had been grown in the varietal test plots at the Experimental Farm under uniform growing conditions and cultural treatment were checked for chipping quality.

Samples were received in November and stored at 38-40° until March. On withdrawal from storage, tubers were selected immediately for reducing-sugar determinations and for chipping. The remainder of the sample was held at 68-70°F. three weeks and then examined for reducing sugar and chipping quality.

Reducing sugars were determined by the method developed at this laboratory by Townsend. Chipping quality was determined by slicing washed and peeled tubers in 1/16" slices, rinsing in cold water and frying in corn oil (Mazola) two minutes at a starting temperature of 375°F.

All varieties produced dark chips when fried direct from storage, and none were of acceptable color. After conditioning, acceptable chips were produced from the following varieties: Chippewa, Idaho Russet, Red Warba, Kennebec, Russet Sebago and Katahdin. Unsatisfactory color was found in Early Rose 216, Houma, Epicure, Earline, Teton, Warba, Canso, Chisago, and Pontiac.

FIELD HUSBANDRY

(J. S. LEEFE)

Grass Silage

During the period covered by this report tests with grass silage included a comparison of preservatives in a trench silo and estimations of dry-matter losses in upright, trench, horizontal and stack silos.

The material ensiled consisted of a mixture of orchard grass, timothy and ladino clover. In all cases observations were made on the quality and palatability of various silages.

Cutting dates varied somewhat between seasons, the earliest starting date being the first week and the latest finishing date the third week in June. The cutting dates were on the average some ten days earlier than is usual in this district.

Use of preservatives in silage

In the comparison of preservatives, a covered concrete-lined trench silo of 175 tons capacity was used. This silo was divided into three compartments. A five-year comparison was made between no preservative and molasses at the rate of 30 pounds per ton. In the third compartment, ground oats, 100 pounds per ton, was added for the first three years, and in the last two years sodium metabisulphite, at 8 pounds per ton.

The figures in Table 19 indicate that the silages were very similar. The crude protein percentages are satisfactory but are not unduly high for silages to be fed to dairy cows. They emphasize the necessity of early cutting of this type of forage, containing as it does a high proportion of grass to clover.

Table 19.—A comparison of the influence of preservatives on silage made in a trench silo.

Preservative used	Moisture content		pH of the silage	Acid calculated as lactic acid	Crude protein content of the dry matter	
	Ensiled grass	Silage			Ensiled grass	Silage
	%	%	%	%	%	%
None.....	79.4	80.1	4.74	2.16	12.21	11.55
Molasses.....	81.4	81.9	4.41	2.26	12.00	13.17
None.....	79.6	79.4	4.69	1.79	12.13	11.02
Molasses.....	77.9	77.5	4.69	2.09	11.83	11.92
Ground Oats.....	75.7	74.6	4.50	2.02	12.67	12.52
None.....	79.2	81.2	4.81	2.63	12.45	13.13
Molasses.....	78.6	79.7	4.33	3.75		
Sodium-meta-bisulphite....	78.9	80.0	4.52	2.65		

As measured by pH and acid content the addition of molasses made the best silage, although the differences were small. In so far as color and palatability were concerned the addition of molasses or ground oats improved the color of the silage, but the apparent palatability to both dairy and beef cattle was not changed. In the two years that it was used sodium meta-bisulphite produced a silage with a somewhat sour odor. When first fed it was not relished by cattle but in a short time they appeared to become accustomed to silage treated with this material.

Silage losses in different types of silos

Records of losses from several types of silos were kept during the period covered by this report. These figures show the size of the losses that can be expected from different types of silos. A summary of the loss data is given in Table 20.

The quality of the silages made in all these silos was quite acceptable but the total losses of dry matter, i.e., shrinkage plus spoilage, were excessive in many cases. The large upright, the covered concrete trench and the solid plank wall horizontal silos were the only ones considered to give satisfactory results.

Table 20.—Silage losses in different types of silos.

Type of silo and approximate capacity	Number years	Moisture in ensiled forage	Average annual dry matter stored	Average annual dry matter removed			Total loss of dry matter from harvest to feeding
				Usable silage	Spoiled silage	Per cent spoiled	
		%	tons	tons	tons	%	%
Store upright 100 tons.....	1	75.0	17.1	13.6	2.1	13.4	20.5
Store upright 30 tons.....	2	76.0	6.0	3.6	0.8	18.2	40.0
Trench, 175 tons concrete lined covered.....	4	78.5	12.4	8.4	0.6	6.7	32.3
Stack silo, 75 tons chopped forage.....	1	75.0	14.0	7.4	2.3	23.7	47.1
Stack silo long grass.....	1	68.0	9.8	4.1	2.2	34.9	58.2
Horizontal silo, 100 tons solid plank walls.....	1	76.9	21.8	13.6	2.5	15.5	37.6
Horizontal silo, 100 tons slatted plank walls.....	1	77.1	19.5	9.5	3.0	24.0	51.3

Chemical Weed Control

During the period under review, tests with herbicides were carried out on various crops including oats, canning peas, field beans, asparagus and strawberries. Tests to develop a satisfactory chemical method of controlling couch grass in fields and apple orchards were also begun.

Canning peas are an important economic crop in this district and during the review period nineteen different chemicals were tested as pre-emergence or post-emergence herbicides on this crop. Two amine formulations of DNOSBP (Dow Premerge and Sinox PE) gave excellent weed control (Figure 8) when applied as a pre-emergence spray at a rate of 4 pounds of active ingredient (1 gallon of formulation) in 40 gallons of water per acre. Both these materials, at one pound per acre in 40 gallons of water, can be used as a post-emergence spray when peas are about six inches tall. Provided air temperatures are high enough (70°F. or over) this treatment will give a fair measure of control of wild radish, lamb's quarters and red root pigweed (*Amaranthus retroflexus*). This treatment can be held in reserve in circumstances where weather conditions have made the more effective pre-emergence treatment impractical.

Tests with field beans have been directed toward determining if this crop can be grown without cultivation, with weeds controlled by a pre-emergence spray of DNOSBP at four pounds per acre. This test has been in operation for only two seasons. Indications are that satisfactory yields can be obtained and that late season weed growth is suppressed by a seven-inch row spacing.

Some tests on weed control with asparagus have been carried out. Of the chemicals tested, CMU (Monuron) one pound per acre applied as a spray in 40 gallons of water per acre, before the asparagus emerges in the spring, has given satisfactory control of annual weeds until late summer.

Extensive tests with herbicides in newly planted strawberries were begun in 1956. Small-scale tests with herbicides to control chickweed (*Stellaria media*) in strawberry beds have been conducted during the past three years. These tests show that three pounds of Chloro IPC applied as a spray in 40



Figure 8. Chemical weed control in Perfection canning peas. Left. Field treated with 4 quarts of pre-emergence herbicide per acre. Right. Untreated area of the same field.

gallons of water per acre, will control this weed without injury to strawberry plants. The spray must be applied in the fall after the strawberries have stopped growing.

Couch grass (*Agropyron repens*) is probably the greatest nuisance of any weed infesting crop land and young orchards in this district. Two new chemicals, Dalapon and Amino-triazole, which show considerable promise in combating this weed have been introduced. Several projects are now under way to test these two chemicals. Recommendations that can be made at the present time as a result of this work are as follows:

Around young apple trees a spray containing Dalapon, five pounds per acre, applied in the spring when couch grass is growing vigorously, will give satisfactory control of couch without injury to young apple trees.

In infested fields, fall applications of Dalapon, ten pounds per acre, applied to standing couch will control this weed during the following season. Spring applications will also give control but the practice cannot be recommended until more information is available concerning possible residual effects of the chemical on crops planted the same season.

POULTRY

(F. G. PROUDFOOT)

Design of Comparative Poultry Tests

During the past three years experimental work on poultry has been largely concentrated on investigations into the most desirable design of the "random sample test" as used for the comparative genetic evaluation of egg production strains of fowl.

The first test in this series of experiments was designed to (1) estimate the reliability of the fifty-bird sample size, and (2) compare the performance of different strains, housed by strains in 50-bird pens, and intermingled in one large pen containing over 600 birds.

Although strain differences were highly significant there was very close agreement between replicates within strains. There were no significant pen-

location effects for the traits studied which included egg production, mortality, body weight and feed efficiency. Also there were no significant differences between the performance of the intermingled group and the birds housed in the twelve small pens for all traits studied with the exception of body weight. This difference in body weight is considered to be due to management factors; when these were corrected in a repeat experiment no difference could be demonstrated.

Intermingling of strains during the laying period is not considered desirable in view of the loss of feed efficiency data and the extra labor required for trapping birds. The evidence from this experiment indicates that intermingling of test stock during the laying period is not a necessary procedure for the comparative evaluation of an egg production strain. However, when uniform, easily serviced pens are not available, unbiased comparisons of egg production performance, livability, etc., for different strains can be obtained by intermingling these strains.

Confinement vs. range rearing

The second test in the series in addition to the objectives of the first test, was designed to show the effect of confinement versus range rearing on the performance of egg production fowl. Six strains of White Leghorns were used in this comparison.

This test is now completed and although data have not been fully analyzed, early results indicate, in general, that the conclusions of the first test have been supported. Little if any difference was found between the performance of the range-reared and the confinement-reared groups with the possible exception of body weight.

Broodiness Control Trials

As broodiness has been a problem, particularly among heavy breed crosses during warm weather, a preliminary investigation was initiated on a co-operative basis to determine the effect of intra-muscular injections of diethylstibestrol as a control of broodiness, versus confinement control in broody coops and broody pens.

The summary of the results of this experiment are presented in Table 21. A total of 7,093 hens were involved in the experiment with 3,538 hens used as a control group. In the other group comprising the remainder, hens which became broody were confined for 24 hours and treated with two intra-muscular injections of a preparation called "No Brood". The two injections contain a total of 25 mg. diethylstibestrol. The control group received no injections but broody hens were confined for a period of 48 hours.

The results of this preliminary investigation show that there was no economic gain by the use of the diethylstibestrol under the conditions of this experiment.

Table 21.—Performance of two groups of laying hens when broodiness was controlled by injections of diethylstibestrol versus confinement for 48 hours (September 9 to January 8)

Group	No. birds	Mortality %	Total broody birds	Birds broody twice or more	Mean egg production (Bird/day basis)
Treated.....	3,555	9.8	804	751	85
Control.....	3,538	9.0	808	765	85
Totals & Means.....	7,093	9.4	1,612	1,516	85

Shell strength and other traits

Considerable experimental work has been done at the Kentville Farm relative to the inheritance of shell quality in poultry and the relationship between shell quality and other economic traits. This work showed that heredity plays an important role in the strength of the egg shell and improvement can be made in shell strength in a relatively few generations through selection.

Apparently results secured on the comparative relationship between shell strength and other economic traits such as hatchability, mortality and egg production were confounded by the degree of inbreeding which occurred in the small population being used in the experiment.

The results in this experiment showed a trend of lowered hatchability, vitality and egg production as the experiment was advanced to its later generations, whereas when a much reduced selection pressure for shell strength was used on three commercial flocks on a comparatively large scale, field observations indicated that shell strength was improved without any depressing effect on egg production and livability.

ILLUSTRATION STATIONS

(G. G. SMELTZER)

Illustration Stations permit studying farm problems in their local environment. Through them it is possible to conduct experimental work under the varying climatic and soil conditions within the radius served by the Experimental Farm.

During the past five years the Stations at Chebogue and Newport ceased operation and new ones were opened at Wellington, Yarmouth County and Rawdon Gold Mine, Hants County. Illustration Stations in Western Nova Scotia are now located on the following farms:

<i>Name</i>	<i>Address</i>	<i>Year established</i>
W. I. Falkenham and Son	Lilydale, Lunenburg Co.	1933
James Main and Son	Noel Shore, Hants Co.	1939
J. R. Deveau and Son	Mavillette, Digby Co.	1942
E. G. Campbell and Sons	Stewiacke, Colchester Co.	1949
John Jensen	Wellington, Yarmouth Co.	1954
Winston Meehan	Rawdon Gold Mine, Hants Co.	1955

A new program of experimental work was established on the Illustration Stations starting in 1954. The experiments emphasize grassland farming and have been set up in such a way that it is possible to obtain reliable information on local agricultural problems.

Farm Management and Business Study

Farm business records are kept by all operators so that the factors related to the success of the farm operation may be measured. At the end of each year a complete farm inventory is taken covering all aspects of the farm business. Three of the more important phases of this study concern land utilization, farm capital and sources of revenue.

Land utilization

A summary of land use as determined from 1956 inventories on the six stations is presented in Table 22. Hay land makes up almost 15 per cent of the total acreage of the Illustration Station farms in this district, while woods and wasteland comprise almost three-quarters of the farm area.

Table 22.—Land utilization on the Illustration Station Farms, Western Nova Scotia, 1956.

	Average acreage per farm	Per cent of total farm area
	acres	%
Grain.....	10.6	3.7
Hay.....	42.9	14.7
Corn and roots.....	0.8	0.3
Potatoes.....	1.1	0.4
Experimental plots.....	2.4	0.8
TOTAL CROPPED AREA.....	57.8	19.9
Pasture.....	21.7	7.5
Woods and wasteland.....	211.0	72.6
TOTAL AREA IN OCCUPIED FARM.....	290.5	100.0

Farm capital

Capital invested in land and buildings varies from 27.6 per cent to 45.1 per cent; in livestock from 11.0 per cent to 19.8 per cent; in machinery and equipment from 18.0 per cent to 34.6 per cent; and in feeds and supplies from 16.4 per cent to 26.3 per cent. Investment per acre of cropland ranged from \$262 to \$783 with an average of \$445.

Sources of revenue

Table 23 gives the average percentage contribution of different farm enterprises for the period 1952-1956. It may be noted that the greatest source of revenue is from cattle and dairy products, largely fluid milk.

Table 23.—Sources of revenue on the Illustration Station Farms, Western Nova Scotia, 1952-56.

Sources	Per cent of total farm income
Cattle and Dairy Products.....	72.8
Field Crops.....	8.9
Hogs.....	6.2
Poultry.....	4.9
Sheep.....	1.4
Garden and Orchard.....	0.4
Miscellaneous.....	1.6
Income in Kind.....	3.8

Pasture Fertilization**Nitrogen**

Considerable experimental work has been done on timing nitrogen applications so that a more uniform volume of pasture herbage may be possible throughout the growing season.

When ammonium nitrate 33 per cent was applied at the rate of 100 pounds per acre during early May the volume of herbage greatly increased during May, June and early July but then declined rapidly during midseason. When one-half of the ammonium nitrate was applied in early May and the balance the first week in July, or the full amount applied in July, the yield was more uniform with less depressing effect on legume stand than was obtained with early spring applications.

Winter or Fall Planted Cereals

Extensive testing of winter cereals is being carried out at Lilydale, Mavillette, Yarmouth, Noel Shore, Rawdon, East Stewiacke and the Kentville Experimental Farm. The planting dates were the middle of September with harvesting the middle of August. The average yield records are given in Table 24.

Table 24.—Average yield of winter cereals on Illustration Stations in western Nova Scotia.

Wheat (3 years)		Rye (2 years)		Barley (2 years)	
Variety	Average yield (bu.)	Variety	Average yield (bu.)	Variety	Average yield (bu.)
Genessee.....	42.2	Dominant.....	58.5	Kenate.....	40.0
Richmond.....	41.5	Petkus CD5169.....	54.5	Wong.....	22.5
Fairfield.....	40.9	Horton.....	52.5		
Dawbud.....	40.0	Imperial.....	50.0		
Rideau.....	38.7	Kings II.....	43.5		
Kharkov.....	22.1				



Figure 9. Chemical control of wireworm in newly seeded land. Treated plot in center of photograph, untreated area in foreground.

Wireworm Control by Chemicals

The introduced European wireworm, *Agriotes obscurus* L., has become a serious problem at the Illustration Station in Lunenburg County and is a widespread pest of the coastal districts of western Nova Scotia. Good control of wireworm was obtained (Figure 9) by the use of all chemicals under study. Aldrin and heptachlor are the chemicals generally being used by the farmers and they are giving good control (Table 25).

Table 25.—Effectiveness of different chemicals for wireworm control, potatoes, grain and hay, Lunenburg, N.S.

Treatment per acre	Potatoes 1954 per cent reduction in tuber injury	Grain 1955 bu. per acre	Hay, 1956	
			Dry matter lb. per acre	Per cent legumes
Aldrin 20% concentrate, 3 lb.....	9.2	60.7	3,918	65
Aldrin 5% granular, 3 lb.....	34.6	69.2	4,221	56
Heptachlor 20% concentrate, 3 lb.....	29.6	66.0	4,417	66
No treatment.....	0.0	42.2	3,481	52

Field Days

Field Days have been held twice each year at the Illustration Stations, once in June and again in August. Their purpose is to provide an opportunity for farmers in each district to see the experimental projects in progress. For each field day arrangements are made for a special speaker and a tour of the plots.

The total yearly attendance at the 34 Field Days held during the last three years has been 521 persons. A number of these have been members of the 4-H Clubs who have taken a keen interest in the experiments.

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